System Requirements Document Updates to the Human Research Facility (HRF) Surface, Water, and Air Biocharacterization (SWAB) Experiment (LS-20444-1)

LS-20444-1, Global Changes throughout the document

From:

HRF ASD Equipment

To:

HRF SWAB equipment

From:

SWAB ASD Equipment

To:

HRF SWAB equipment

From:

ASD Equipment

To:

HRF SWAB equipment

From:

6000.1C

To:

6000.1

LS-20444-1, 2.1, pp. 2-1 through 2-2

Add:

KHB 1700.7	C 8/99	Space Shuttle Payload Ground Safety Handbook
NHB 6000.1	D	Requirements for Packaging, Handling, and Transportation - Electronics Control Unit (ECU)
MIL-A-8625	9/93	Anodic Coatings for Aluminum and Aluminum Alloys
NASA-STD-6001	02/98	Flammability, Odor, Offgassing and Compatibility Requirements and Test Procedures for Materials in Environments that Support Combustion
NT-CWI-001	A Ch. 2 07/31/01	Task Performance Sheet (TPS)
SAIC-TN-9550	12/01	Ionizing Radiation Dose Estimates for International Space Station Alpha using the CADrays 3-D Mass Model
SSP 30223	G 4/98	Problem Reporting and Corrective Action Space Station Program
SSP 30257:004	E 11/96	Space Station Program Intravehicular Activity Standard Restraints and Mobility Aids Interface Control Document
SSP 30695	A 1/95	Acceptance Data Package Requirements Specification

LS-20444-1, 3.1, pg. 3-1

From:

> The SWAB Experiment system includes hardware designed by the HRF, which include the SWAB Air Sampling Device (ASD), ASD Battery Pack and ASD Filter Unit. This equipment will be designed and certified under this requirements document for use on the International Space Station (ISS) as a part of the HRF program.
>
> The ASD is one part of the entire experiment cadre of hardware; however, the other remaining portions of this experiment will utilize modified Government Furnished Equipment (GFE) hardware developed and certified by the Crew Health Care System (CHeCS). This document does not levy any new requirements into the CHeCS GFE hardware but does have functional requirements specific for the SWAB experiment system related to the functional use of the CHeCS designed equipment. Any other HRF hardware used with this experiment is certified under separate documentation, which is maintained by the appropriate program(s).

To:

> The SWAB experiment equipment will be designed and certified under this requirements document for use on the International Space Station (ISS) as a part of the HRF program.
>
> SWAB will also use some Government Furnished Equipment (GFE) hardware developed and certified by the Crew Health Care System (CHeCS). This document does not levy any new requirements on the CHeCS GFE hardware but does have functional requirements specific for the SWAB experiment system related to the functional use of the CHeCS designed equipment. Any other HRF hardware used with this experiment is certified under separate documentation, which is maintained by the appropriate program(s).

LS-20444-1, Table 3.1-1, pg. 3-1

From:

Item Name	Notes
SWAB ASD Kit	Will Contain the HRF ASD and ASD Battery Packs for this experiment.
SWAB ASD Pouch	This is the pouch that will make up the kit above.
HRF Air Sampling Device (ASD)	Modified Commercial-Off-the-Shelf (COTS) Unit used to acquire air samples for the SWAB Experiment
HRF ASD Battery Pack	Modified Commercial-Off-the-Shelf (COTS) Battery pack specifically designed by ASD manufacturer for the ASD
SWAB Sample Kit	This kit will contain all the sample media to collect the SWAB experiment samples. Includes equipment below.
SWAB Sample Kit Pouch	This is the pouch that will make up the kit above.
SWAB Transfer Kit Pouch	This pouch, which is empty when launched, will hold the experiment samples that are to be returned to the ground.
Water Sampler Assembly, Potable, Sterile	This device is a CHeCS developed item that will be used to collect water from the SRV-K potable water port on the ISS. This part has been certified for flight per GCAR# G3628
Adapter Probe Assembly, SVO-ZV Port	This device is a CHeCS developed item that will be used to collect water from the SVO-ZV potable water port on the ISS. This part has been certified for flight per GCAR# G3628
Sample Bag, Chemical, Post-Flight Analysis (1L)	This device is a CHeCS developed item that will be used to collect and store the water samples. This part has been certified for flight per GCAR# G3304.
(SWAB) Buffer Tube	This device is a CHeCS developed item that will be used to collect and store the surface samples. This part has been certified for flight per GCAR# G3723.
HRF ASD Filter Unit	These filter units are Modified Commercial-Off-the-Shelf (COTS) equipment that interface to the HRF ASD to acquire the air samples.

To:

Item Name	Notes
SWAB Experiment Kit	Top Level Kit that holds all the associated collection hardware
SWAB Experiment Kit Pouch	This is the top-level kit pouch that will be used to hold all the SWAB collection hardware.
SWAB ASD Stowage Foam	Will support/contain the HRF ASD and ASD Battery Packs for this experiment.

SWAB ASD Air Sampling Device	Modified Commercial-Off-the-Shelf (COTS) Unit used to acquire air samples for the SWAB Experiment
HRF ASD Lithium Battery	Custom battery pack configured with flight approved Li-BCX Cells from USA.
SWAB Return Kit	This Nomex Pouch will house all collected samples taken to be returned to earth. There will be two for each SWAB Experiment Kit.
SWAB Tube Kit	This Kit will contain all the swab tubes required to acquire the surface samples for the increment.
SWAB Tube Kit Pouch	This is the Nomex softgoods pouch that is used to make up the Swab Tube Kit
SWAB Tube	These are the actual swab tubes that are experiment specific used to acquire the surface samples for the experiment.
SWAB Water Bag Kit	This is the kit that will contain the necessary water collection hardware to complete a water sample session.
SWAB Water Bag Kit Pouch	This is the Nomex softgoods pouch that is used to make up the Swab Water Bag Kit
SWAB TEMPORARY WATER BAG XXXX	These are the different temporary water bags that will be used to collect the water from each source, SVO-ZV, SRV-K HOT and SRV-K Warm. Each bag will be configured with a water sampler adapter below and a BZK wipe.
Water Sampler Assembly, Potable, Sterile	This device is a CHeCS developed item that will be used to collect water from the SRV-K potable water port on the ISS. This part has been certified for flight per GCAR# G3628. These will be configured with the SWAB TMPRY Water Bags
Adapter Probe Assembly, SVO-ZV Port	This device is a CHeCS developed item that will be used to collect water from the SVO-ZV potable water port on the ISS. This part has been certified for flight per GCAR# G3628. These will be configured with the SWAB TMPRY Water Bags
SWAB FINAL WATER KIT	This water bag kit is actually the combination of the SWAB Final Water Bag and an outer Bitran (waterproof) bag.
SWAB FINAL WATER BAG XXXX	These are the different final water bags that contain the Sodium Dodecyl Sulfate (SDS) fixative agent and will be used to hold the water to bring back to earth. Water is transferred to these bags from the temporary water bags above.
SWAB Syringe	This syringe is a COTS syringe used to possibly collect free floating condensate in the ISS and then transfer to one of the final water bags.
SWAB ASD FILTER KIT	This is the kit that will contain the necessary surface collection filter units to complete the air sampling sessions.
SWAB ASD Filter Kit Pouch	This is the Nomex softgoods pouch that is used to make up the SWAB ASD Filter Kit.
SWAB ASD Filter	These filter units are Modified Commercial-Off-the-Shelf (COTS) equipment that interface to the HRF ASD to acquire the air samples.

LS-20444-1, 3.1.1, pg. 3-2

From:

Potable water samples will be collected directly into 1-liter Teflon bags that are currently approved for in-flight use. In-flight ISS water sampling sites will include the Russian humidity Condensate Recovery System (SRV-K) that regenerates water for potable use as well as the SVO-ZV system. If available, free condensate, which accumulates during extended missions, will be collected using a surface sampling swab.

To:

Potable water samples will be collected directly into 1-liter Teflon bags. In-flight ISS water sampling sites will include the Russian humidity Condensate Recovery System (SRV-K) that regenerates water for potable use as well as the SVO-ZV system. If available, free condensate, which accumulates during extended missions, will be collected using a surface sampling swab.

LS-20444-1, 3.1.1.1, pg. 3-3

From:

Surface samples will be collected using the damp swab and liquid vial currently designed as the contingency method for the National Aeronautics and Space Administration (NASA) Surface Sample Kit, approved for inflight use. Specifically, a 25 cm^2 surface area is wiped with a pre-moistened cotton swab and then returned to a vial containing a known amount buffer solution.

Potable water samples will be collected directly into 1 liter Teflon bags currently approved for in-flight use. ISS water sampling sites will include SRV-K that regenerates water for potable use as well as the SVO-ZV dispensing ports. If available, free-floating condensate, which accumulates during extended missions, will be collected using a surface sampling swab.

To:

Surface samples will be collected using a moistened swab from the experiment specific swab tube and then stowed back on the tube where it punctures a seal and is soaked in an SDS/water solution. Specifically, a 25 cm^2 surface area is wiped with a pre-moistened cotton swab and then returned to a vial containing a known amount buffer solution.

Potable water samples will be collected directly into 1-liter Teflon bags then transferred to another experiment unique water bag that contains a SDS fixative solution to preserve the sample at that specific point in time. ISS water sampling sites will include SRV-K that regenerates water for potable use as well as the SVO-ZV dispensing ports. If available, free-floating condensate, which accumulates during extended missions, will be collected using a surface sampling swab.

LS-20444-1, 3.2.4F, pg. 3-8

From:

F. Not Applicable to the HRF ASD Equipment.

To:

F. Payload containers of liquids or particulate matter shall have built-in equipment/methods for control of vaporization, material overflow, or spills. (LS-71000, Section 6.4.3.1.2A)

LS-20444-1, 3.2.3.2, pg. 3-8

From:

The HRF ASD equipment shall be designed for a 10-year utilization with ground refurbishment. (LS-71000, Section 7.2.1) This useful life can be obtained by replacing limited life items (e.g., batteries) with Orbital Replacement Units (ORUs) and/or allowing for ground refurbishment. (LS-71000, Section 7.2.1)

To:

The HRF ASD equipment shall be designed for a 1-year utilization with ground refurbishment. (LS-71000, Section 7.2.1) This useful life can be obtained by replacing limited life items (e.g., batteries) with Orbital Replacement Units (ORUs) and/or allowing for ground refurbishment. (LS-71000, Section 7.2.1)

LS-20444-1, 3.2.5.1.3.3, pg. 3-10

From:

The HRF ASD Equipment shall be designed not to produce an unsafe condition or one that could cause damage to equipment external to the ASD as a result of exposure to Single Event Effect (SEE) ionizing radiation, assuming exposure levels specified in SSP 30512, paragraph 3.2.1, with a shielding thickness of 25.4 mm (1000 mils). (LS-71000, Section 6.3.7.3.3)

To:

The HRF SWAB equipment shall be designed not to produce an unsafe condition or one that could cause damage to equipment external to the HRF SWAB equipment as a result of exposure to Single Event Effect (SEE) ionizing radiation, assuming exposure levels specified in SSP 30512, paragraph 3.2.1, with a shielding thickness of 25.4 mm (1000 mils). (LS-71000, Section 6.3.7.3.3)

LS-20444-1, 3.2.7.1.1, pg. 3-17

From:

Not Applicable to the HRF ASD Equipment. The ASD Equipment has no physical mating via connector to any other object.

To:

Not Applicable to the HRF SWAB equipment. The HRF SWAB equipment has no physical mating via connector to any other object.

LS-20444-1, 3.2.7.5.22, pg. 3-27

Add:

3.2.7.5.22 Potable Water Use

SWAB use of water from the ISS water system that is not returned to the cabin air as humidity shall not exceed a daily average of 2.2 kg/day (4.8 lbm/day) based upon weekly usage.

LS-20444-1, 3.3.6.14, pg. 3-35

From:

> Not Applicable to the HRF ASD Equipment.

To:

> Payload hardware mounted into a capture-type receptacle that requires a push-pull action shall require a force less than 156 N (35 lbf) to install or remove. (LS-71000, Section 6.4.4.2.5)

LS-20444-1, 3.3.8.1.A.1, pg. 3-46

From:

1. Not Applicable to the HRF ASD Equipment.

To:

1. MPLM Launch and Landing Loading – For early design, the acceleration environment defined in Table 3.3.8.1-1, "Payload Mounted Equipment Load Factors (Equipment Frequency 35 Hz)" will be used. These load factors will be superceded by load factors obtained through ISS performed Coupled Loads Analysis as described in SSP 52005.

TABLE 3.3.8.1-1. HRF RACK MOUNTED EQUIPMENT LOAD FACTORS (EQUIPMENT FREQUENCY 35 HZ)

Liftoff	**X**	**Y**	**Z**
(g)	±7.7	±11.6	±9.9
Landing	**X**	**Y**	**Z**
(g)	±5.4	±7.7	±8.8

NOTE: Load factors apply concurrently in all possible combinations for each event and are shown in the rack coordinate system defined in SSP 41017, Part 2, Paragraph 3.1.3.

LS-20444-1, 3.3.8.1.2, pg. 3-47

From:

3.3.8.1.2 Safety Critical Structures Requirements

Not applicable to the HRF ASD Equipment and stowage pouches. The HRF ASD Equipment and stowage pouches are not safety critical structures. Any device failure is not critical and is contained to the device. The ASD and pouches are crit level three.

To:

3.3.8.1.2 Safety Critical Structures Requirements

Not applicable to the HRF SWAB equipment. The HRF SWAB equipment has no safety critical structures. Any device failure is not critical and is contained to the device. The HRF SWAB equipment is crit level three.

LS-20444-1, 3.3.8.1.3, pg. 3-47

From:

> Payloads shall provide positive margins of safety for launch and landing loading conditions in the MPLM based on an acceleration environment as defined in SSP 41017 Part 1, paragraph 3.2.1.4.2, with a full complement of generic 4 panel unit Standard Interface Rack (SIR) drawer payloads. Loads should be applied consistent with the rack coordinate system defined in SSP 41017, Part 2, paragraph 3.1.3. (LS-71000, Section 6.1.1.3.A)

To:

> Not Applicable to SWAB.

LS-20444-1, 3.4.1.B , pg. 3-48

From:

B. SWAB ASD shall operate nominally following exposure to -50 °C to 50 °C (-58 °F to 122 °F).

To:

B. SWAB shall operate nominally following exposure to 10 ^{o}C to 46 ^{o}C (50 ^{o}F to 115 ^{o}F).

LS-20444-1, 3.4.4, pg. 3-38

From:

3.4.4 Electrical, Electronic, and Electromechanical Parts Control, Selection, and Burn-In

A. Parts control shall be in accordance with SSP 30312, "Electrical, Electronic and Electromechanical (EEE) and Mechanical Parts Management and Implementation Plan for Space Station Program."

B. Parts selection for equipment shall be in accordance with:

1. SSP-30423, "Space Station Approved Electrical, Electronic and Electromechanical (EEE) Parts List."

2. SSQ-25002, "Supplemental List of Qualified Electrical, Electronic, Electromechanical (EEE) Parts, Manufacturers, and Laboratories (QEPM&L)."

3. Semiconductors shall be JANTXV in accordance with MIL-PRF-19500, "Performance Specification Semiconductor Devices, General Specification for." Diodes shall have a metallurgical bond. Passive parts shall be at least the second highest level of appropriate Military Established Reliability (MIL-ER).

4. SSP-30512C, "Space Station Ionizing Radiation Design Environment."

Where no alternative is available, nonmilitary parts, components, and subassemblies may be used, but burn-in screening of these items shall be performed per 3.4.4C.

C. Burn-in screening shall be completed (100%) on all flight hardware (units).

To:

3.4.4 Electrical, Electronic and Electromechanical Parts Burn-In

Burn-in screening shall be completed (100%) on all flight hardware (units).

LS-20444-1, 3.4.13, pg. 3-50

From:

3.4.13 Humidity Environment Compatibility

HRF ASD Equipment shall operate nominally during exposure to a relative humidity of 95 percent. (Russian П32928-103 document).

To:

<Deleted>

LS-20444-1, 4.0, pg. 4-1

From:

> This section contains the required verification methods for ISS interface certification, science functional acceptance, and program qualification and acceptance. Section 4.1 addresses definitions for terms used herein.
>
> Appendix B contains the applicability matrix for ISS Pressurized Payload Interface Requirements Document requirements. The Verification Data Sheet (VDS) addressing the appropriate method for ISS interface verification is also contained in Appendix B. If an alternate verification method is desired, the new verification method must be negotiated in the Unique Payload Verification Plan (UPVP).
>
> Section 4.2 contains the verification methods for science functional acceptance. Appendix C contains the applicability matrix for science functional requirements.
>
> Section 4.3 contains the verification methods for program qualification and acceptance requirements. Appendix D contains the applicability matrices for acceptance and qualification requirements.
>
> The responsibility for the performance of all verification activities is as specified in Appendices B, C and D. All testing described in Appendices B, C and D shall be documented via TPS (JSC Form 1225) per JSC Work Instruction NT1-CWI-001. Except as otherwise specified in the contract, the provider may use their own or any other facility suitable for the performance of the verification requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the verifications set forth in this specification.

To:

This section contains the required verification methods for ISS interface certification, science functional acceptance, and program qualification and acceptance. Section 4.1 addresses definitions for terms used herein.

Appendix B contains the applicability matrix for ISS Pressurized Payload Interface Requirements Document requirements. The verification method is also contained in Appendix B. If an alternate verification method is desired, the new verification method must be negotiated in the Interface Control Document (ICD).

Appendix C contains the applicability matrix for science functional requirements.

Section 4.3 contains the verification methods for program qualification and acceptance requirements. Appendix D contains the applicability matrices for acceptance and qualification requirements.

The responsibility for the performance of all verification activities is as specified in Appendices B, C and D. All testing described in Appendices B, C and D shall be documented via TPS (JSC Form 1225) per JSC Work Instruction NT-CWI-001. Except as otherwise specified in the contract, the provider may use their own or any other facility suitable for the performance of the verification requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the verifications set forth in this specification.

Appendix E contains the applicability matrix for Orbiter Middeck IDD requirements.

Appendix F contains the applicability matrix for ISS Russian Segment requirements.

LS-20444-1, 4.2, pg. 4-2

From:

4.2 FUNCTIONAL PERFORMANCE ACCEPTANCE TESTING

The requirements herein describe specific test requirements for functional performance acceptance. The Principal Investigator (PI) will evaluate the data resulting from the science-related functional performance acceptance tests for confirmation of proper functionality.

The functional performance requirements specified in Section 3.2.1.1 shall be verified by one or more of the following methods: demonstration, test, analysis and inspection.

To:

4.2 RESERVED

LS-20444-1, 4.3.4, pg. 4-4

From:

4.3.4 Electrical, Electronic and Electromechanical Parts Control, Selection, and Burn-In

A. Compliance with 3.4.4A is considered successful when it can be shown via analysis that the parts control process is compliant with 3.4.4A.

B. Compliance with 3.4.4B is considered successful when an analysis is provided that includes a risk assessment, electrical stress analysis, and data delivery on information such as designed/as-built EEE parts, list, construction history, Government and Industry Data Exchange Program (GIDEP) Alerts, part obsolescence, radiation susceptibility and/or prior history.

C. The HRF ASD equipment undergoing burn-in testing shall be defined in a test plan or test procedure. The pass-fail criteria for the functional test, and the definition of the functional test will be equipment-unique and defined in the test plan or test procedure. Functional tests shall be conducted on end items prior to, during and after environmental exposure

To:

4.3.4 Electrical, Electronic and Electromechanical Parts Burn-In

The burn-in test may be accomplished at the component or assembly level, and is specified as:

- 72 hrs continuously at room ambient temperature while functioning. During this test, two sets of 5 power cycles each shall be performed. Each set of 5 power cycles shall be completed within a period of 20 minutes. Power cycle timing shall allow sufficient time for the hardware and electronics to reach a steady-state before power to the hardware is restored following power-down.

- 96 hrs continuously at a specified controlled temperature while functioning. During this test, three sets of 5 power cycles each shall be performed. Each set of 5 power cycles shall be completed within a period of 20 minutes. Power cycle timing shall allow sufficient time for the hardware and electronics to reach a steady-state before power to the hardware is restored following power-down.

Full functional tests shall be performed on the experiment hardware before and after the burn-in test. Controlled temperature is defined as 15 ^{o}C below the maximum rating of the device with the lowest temperature rating in the article under test. [LS-71000, Section 5.4.1.1.10]

LS-20444-1, 4.3.13, pg. 4-6

From:

4.3.13 Humidity Environment Compatibility

HRF ASD Equipment shall be inspected to ensure that electrical conductors within the payload housing are not exposed to humidity.

To:

<Deleted>

LS-20444-1, Appendix B, pg. B-1

From:

3.2.4F	6.4.3.1.2A	3.12.3.1.2A	Maintainability Built-in Control	N/A	See ICD		No liquids or particulate matter

To:

3.2.4F	6.4.3.1.2A	3.12.3.1.2A	Maintainability Built-in Control	✓	See ICD		

LS-20444-1, Appendix B, pg. B-5

Add:

3.2.7.5.22		3.8.1.3.A	Potable Water Use	✓	See ICD		

LS-20444-1, Appendix B, pg. B-6

From:

3.3.5.1.1B	6.3.2.10.1	3.2.5.1.1	Mating/Demating of Powered Connectors	N/A	See ICD		The ASD Equipment has no powered interface with station.

To:

3.3.5.1.1B	6.3.2.10.1	3.2.5.1.1	Mating/Demating of Powered Connectors	N/A	See ICD		The HRF SWAB equipment has no powered interface with station.

LS-20444-1, Appendix B, pg. B-8

From:

3.3.6.14	6.4.4.2.5	3.12.4.2.7	Push-Pull Force	N/A	See ICD		No connectors
3.3.8.1A	6.3.1.3A	3.1.1.3A	Structural Design Requirements	N/A	See ICD		Not a Rack
3.3.8.1.3	6.1.1.3.F	3.1.1.3.F	Loads Requirements	✓	See ICD		

To:

3.3.6.14	6.4.4.2.5	3.12.4.2.7	Push-Pull Force	✓	See ICD		
3.3.8.1A	6.1.1.3.F	3.1.1.3F	Structural Design Requirements	✓	See ICD		
3.3.8.1.3	6.3.1.3A	3.1.1.3.A	Loads Requirements	N/A	See ICD		Not a rack

LS-20444-1, Appendix B, pg. B-13

From:

3.3.8.1.2	6.3.1.1	3.1.1.5A	Safety Critical Structures Requirements	N/A	See ICD		The HRF ASD Equipment and stowage pouches are not safety critical structures. Any device failure is not critical and is contained to the device. The ASD and pouches are crit level three.

To:

3.3.8.1.2	6.3.1.1	3.1.1.5A	Safety Critical Structures Requirements	N/A	See ICD		The HRF SWAB equipment has no safety critical structures. Any device failure is not critical and is contained to the device. The HRF SWAB equipment is crit level three.

LS-20444-1, Appendix C, pg. C-2

From:

3.3.6.2.3	6.4.3.5.3	Colors for Soft Goods	✓	Inspection	

To:

<deleted>

LS-20444-1, Appendix D, pg. D-1

From:

3.4.1A		Thermal Environment Compatibility	✓	4.3.1	
3.4.1B		Thermal Environment Compatibility	✓	4.3.1	
3.4.4	5.4.1.1.10	EEE Parts Control, Selection, and Burn-in	✓	4.3.4	
3.4.13		Humidity Environment Compatibility	✓	4.3.13	

To:

3.4.1A		Thermal Environment Compatibility	E	4.3.1	Thermal cycle testing will be documented in a Thermal Cycle Test plan.
3.4.1B		Thermal Environment Compatibility	E	4.3.1	Thermal cycle testing will be documented in a Thermal Cycle Test plan.
3.4.4	5.4.1.1.10	EEE Parts Burn-in	✓	4.3.4	EEE Parts Burn-in may be combined with the Acceptance Thermal Test.

LS-20444-1, Appendix D, pg. D-2

From:

TABLE D-2. NON-CRITICAL HARDWARE QUALIFICATION TEST REQUIREMENTS

Component / Type Test	HRF ASD Equipment	ASD Battery Pack	ASD Filter Unit
Thermal Cycling	✓	✓	**N/A**
Qualification for Acceptance Vibration	N/A	N/A	N/A
Flammability	✓	✓	✓
Offgassing	✓	✓	✓
Bench Handling	✓	✓	✓
Payload Mass Control Plan	N/A	N/A	N/A
EMI/EMC Control Plan	✓	N/A	N/A
Acoustic Noise Control Plan	✓	N/A	N/A
EEE Parts Screening	✓	✓	N/A
EEE Parts Control	✓	✓	N/A
Soyuz/Progress Humidity Environment	✓	✓	✓

To:

TABLE D-2. NON-CRITICAL HARDWARE QUALIFICATION TEST REQUIREMENTS

Component / Type Test	HRF ASD Equipment	ASD Battery Pack	ASD Filter Unit	Water and Surface Sampling Hardware
Thermal Cycling	✓	✓	N/A	N/A
Qualification for Acceptance Vibration	N/A	N/A	N/A	N/A
Flammability	✓	✓	✓	✓
Offgassing	✓	✓	✓	✓
Bench Handling	✓	N/A	✓	N/A
Payload Mass Control Plan	N/A	N/A	N/A	N/A
EMI/EMC Control Plan	✓	N/A	N/A	N/A
Acoustic Noise Control Plan	✓	N/A	N/A	N/A

LS-20444-1, Appendix D, pg. D-3

From:

TABLE D-3. NON-CRITICAL HARDWARE ACCEPTANCE TEST REQUIREMENTS

Component / Type Test	HRF ASD Equipment	ASD Battery Pack	ASD Filter Unit
Thermal Cycling	**E**	**E**	N/A
Acceptance Vibration	✓	✓	N/A
Functional	✓	✓	✓
Burn-in	✓	✓	N/A
Pre-Delivery Acceptance Functional	✓	✓	✓

To:

TABLE D-3. NON-CRITICAL HARDWARE ACCEPTANCE TEST REQUIREMENTS

Component / Type Test	HRF ASD Equipment	ASD Battery Pack	ASD Filter Unit	Water and Surface Sampling Hardware
Thermal Cycling	E	E	N/A	N/A
Acceptance Vibration	✓	✓	N/A	N/A
Functional	✓	✓	✓	✓
Burn-in	✓	✓	N/A	N/A
Pre-Delivery Acceptance Functional	✓	✓	✓	✓